



GOSHEN COLLEGE
MATHEMATICS DEPARTMENT
MATH 105 QUANTITATIVE REASONING – SPRING 2020-21

**Catalog
Description**

Students will interpret, create, and value quantitative information in personal, professional, and societal contexts to solve problems, understand phenomena, draw conclusions, and make decisions. The types of quantitative information students will be able to interpret and create include computations, measurements and units, ratios, proportions, rates, estimates, bar charts, histograms, scatter plots, trend lines, linear and exponential functions, tables, finances, probability, descriptive statistics, and spreadsheets. (3 credit hours)

Prerequisites

While there will be some review, students taking this course are expected to already be able to do the following:

1. Compute sums, differences, products, quotients, roots, and powers involving integers, fractions, decimals, and percentages both by hand and with a calculator.
2. Solve word problems that require only the previously described computations.
3. Use order of operations to determine what computation is to be performed.
4. Compute values from a formula.
5. State and use simple geometric formulas.
6. Measure lengths and weights, and report with appropriate units and precision.
7. Plot points on a coordinate plane.
8. Find quantitative information in the media.

**Am I in the
Right Course?**

This depends both upon your background and goals. If you have major gaps in the prerequisites, you should consider taking one or more developmental math courses at a community college before taking Math 105.

Math 105 Quantitative Reasoning and Math 115 Applied Algebra are designed to equip students with sufficient quantitative reasoning skills to be successful in their natural and social science perspectives courses, be knowledgeable consumers, and be effective citizens. Math 115 also integrates symbolic representation and manipulation as a means for understanding and creating quantitative information. Students who did well with symbolic notation in high school algebra classes will find the symbolic emphasis of Math 115 to be familiar and may find the relative lack of symbols in Math 105 to be unsettling. On the other hand, if high school algebra was difficult, Math 105 may be more comfortable, and Math 115 may be intimidating and challenging.

With respect to goals, if you plan to be an accounting, business, computer science, mathematics, or some natural science major, then you should complete at least Math 115. If you are an elementary education major, you must complete Math 131-132. If you are not ready to jump into Math 115 or 131-132, you must work for an A or B in Math 105 to be sufficiently prepared. If you do not plan to be one of the listed majors, Math 105 will be sufficient for your goals.

If you have any questions about which course you should be in, please talk with your instructor. Everyone wants you to be in the courses that will provide the best path to achieving your goals.

Learning Objectives

Students who successfully complete this course will be able to do the following:

1. Compute and interpret ratios, proportions, weighted averages, unit conversions, scales, rates, densities, concentrations, dosages, percentages, probabilities, and other arithmetic quantities.
2. Use appropriate units and precision when reporting measurements and derived quantities.
3. Find, evaluate, graph, and interpret linear and exponential relationships.
4. Create and interpret a variety of visual representations of data.
5. Estimate, compute, and interpret measures of center, spread, location, and linearity.
6. Use spreadsheet software to organize information, simplify computations, and produce informative graphics.
7. Apply the above skills to solve problems, understand phenomena, draw conclusions, and make decisions in a variety of personal, professional, and societal contexts.
8. Value the use of quantitative information and reasoning when solving problems, understanding phenomena, drawing conclusions, and making decisions as a person, consumer, employee, and citizen.

Instructor

David Housman, SC 117, dhousman@goshen.edu, 535-7405, 574-612-7185 (cell)
Office hours are posted on his office door and on Moodle

Study Sessions and Tutoring

A Student Teaching Assistant (STA) will run study sessions at scheduled times to assist with your learning of the concepts and techniques developed during this course. The schedule will be announced shortly after the beginning of the semester. Ten extra credit points (up to 30 points) will be earned for each study session participation during the first four weeks of the semester. The Academic Success Center provides individual tutoring by appointment at tutorcal.goshen.edu.

Class

TR 8:00 – 9:15 AM in SC 106. Attendance and participation are expected. For students who are unable to attend class in person for legitimate reasons, remote participation via Zoom or a video equivalent will be available. A recording of the Zoom class session or the video equivalent will be available for any student to watch. Class activities will complement, not substitute, for the reading, viewing, and problem-solving students engage in outside of class.

Text

MyLab Math with Pearson eText -- 18 Week Instant Access -- for Thinking Quantitatively: Communicating with Numbers, 2nd Edition, Eric Gaze, ISBN: 9780135988299 directly from Pearson or 9780135910887 for the Access Code Card. You can get temporary access to MyLab Math for free right now using the registration instructions on Moodle. In addition to the eText, MyLab Math contains the homework assignments.

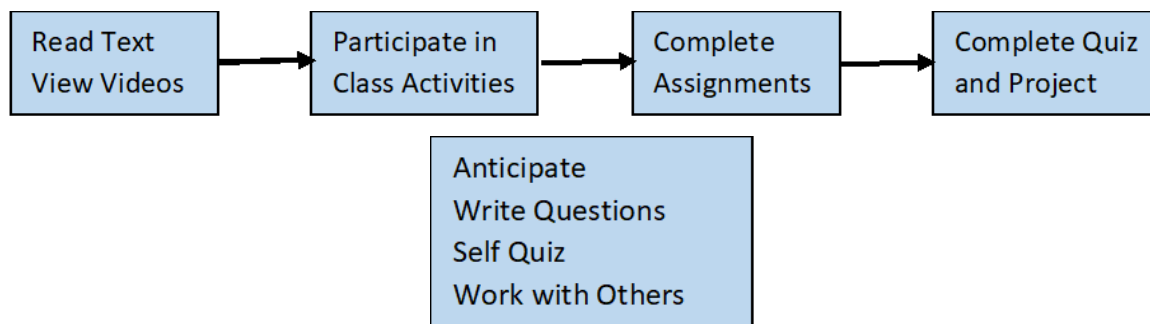
Although the viewing experience is better on a laptop or desktop computer, the MyLab Math eText can be read and homework assignments can be completed using Safari on your iPad. There are a few glitches. Even if you switch off “Block Pop-ups” and “Block All Cookies” in the Safari settings, the MyLab Math log in still thinks that cookies are not enabled, and each pop-up generates a check on whether you want to allow it (answer "yes" so that the pop-up will appear in a new tab). For the e-Text pages that do not fit on a single screen, you will only be able to navigate the page by touching the scroll bar. Also turning pages requires two touches instead of one mouse click. As of late July, Pearson help pages state that MyLab Math is not compatible with Safari 13 on iPads, but their recommendation to use Chrome or Firefox turns out to be even more glitchy than Safari.

Moodle

Moodle (<https://moodle.goshen.edu>) will be used for all electronic aspects of the course other than the eText and homework assignments. Announcements forum and Questions and Answers forum postings will be emailed to students' Goshen email addresses—make sure you check your email regularly.

- Calculator** For quizzes and exams, you must have access to a simple calculator: one that can add, subtract, multiply, divide, exponentiate, and find square roots but does not have graphing or programming capabilities. Such calculators can be purchased for less than \$20. The department has a small number of simple calculators that may be borrowed during class, quizzes, and exams; however, it is best for you to purchase one for yourself so that you can practice using it whenever needed.
- Excel** Microsoft Excel will be used throughout the course. It is available on campus computers (e.g., UN004, GL102, NC12, SC105, VA22), through your [virtual machine connection](#), with the iPad you received from Goshen College, or your free subscription to Microsoft applications by going to <https://office.com/getoffice365> and signing up with your Goshen College email address. Since a mouse and physical keyboard are more efficient input devices when using Excel, I recommend that you use a desktop or laptop computer to complete homework and project assignments that require the use of Excel.
- Notebook** A one-inch three-ring binder with loose-leaf lined and graph paper is recommended so that you can keep printed copies of course resources and a written record of problem-solving attempts, questions, math concept and technique discoveries, and skill assessments. Goodwill stores sell three-ring binders for around \$1.
- Activities Introduction** The study of mathematics is not a spectator sport! Reading, listening, solving problems, writing explanations, reflecting upon ideas, assessing skills, and receiving feedback are essential to learning mathematics. A student with average preparation (B grades in high school algebra and geometry and 500 Math SAT) can obtain an average grade (C+ to B-) with an average of nine hours (3 hours in class and 6 hours outside of class) each week devoted to this course—adjust if you are not average or desire a grade that is not average.
- An athlete plays a game or engages in a contest, an actor performs a role on stage or in front of a camera, an artist creates a painting or sculpture, a musician sings or plays an instrument at a concert, and a quantitatively literate person solves problems. While it may be helpful for an aspirant to observe or listen to an experienced athlete, actor, artist, musician, or quantitatively literate person, it is essential for the aspirant to practice.
- Before the game, the best athletes have practiced passing, throwing, catching, hitting, blocking, dribbling, dodging, kicking, or other relevant skills many times. Before opening night, the best actors have rehearsed their lines, movements, and facial expressions many times. Before creating the piece to be exhibited, the best artists have experimented with materials, colors, and strokes many times. Before the concert, the best musicians have rehearsed the music many times. Likewise, before solving an important real-world problem, the best quantitatively literate persons have solved many other problems.
- Practice makes permanent, with the result that individual skills can be executed with little effort, and multiple skills can be creatively combined to meet more complex challenges. Unfortunately, the permanence can be detrimental (e.g., swinging a baseball bat too high for a slider or using an incorrect algebraic rule). To achieve perfection, feedback and assessment must be integrated with the practice to ensure that the skill is executed correctly and efficiently. Feedback can come from the instructor during class, MyLab Math when answering a question, and the solutions in the text and videos if you have attempted a problem before viewing the solution. Since the goal of this course is for you to become a quantitatively literate person, you should practice solving problems with feedback and assessment as much as possible. Always have paper and a writing instrument available to write down your solutions, discoveries, questions, and assessments; keep these papers in an organized fashion in your three-ring binder.
- The graphic on the next page and the following sections describe recommended activities in more detail.

Activities Outline



Activities Before Class

Before class, read the text and view the videos in an anticipatory fashion: when you have read the description of a problem to be solved or an important statement, (1) cover what follows, (2) think and write your own solution to the problems or reasons the result is true, and only then (3) read the authors' solution or reasons, focusing on the parts you did not already obtain on your own.

If you do not understand some aspect of the text or a video, write a question that is as specific as possible. Sometimes writing the question is enough to spark the insight needed for you to answer your own question. Otherwise, you will be compiling a list of useful questions to ask peers, the STA, tutors, or the instructor. A good time to do this is during the scheduled study sessions.

After reading or viewing an important concept or technique, stop looking at the text or video and try to speak or write a detailed summary of the concept or technique. Then look again at the text or video to determine whether you have correctly remembered the concept or technique. Time spent self-quizzing is a far better way to learn than passively reading the text or viewing the videos multiple times.

If two or more of you are reading or working on problems, try working independently first. After you have made independent attempts, share with each other your questions and understandings.

Activities During Class

Bring to class (1) an iPad or laptop, and (2) paper and writing instruments. This will allow you access to electronic resources and the ability to work on problems, record discoveries, write questions, and capture assessments. During class, actively listen, engage in solving problems, share understandings with peers, ask your unanswered questions, assess your performance, and seek ways to improve your performance. For students unable to physically attend class, there will be a video equivalent available on Moodle.

Activities After Class

After reading the text, watching the videos, and participating in class, you should be ready to complete the homework assignment. MyLab Math exercises deal with the fundamental ideas, provide immediate feedback, can be repeated until correct, will be part of your course grade, and can even be completed after they are due with a 30% penalty. For most of these assignments, you will not be able to simply regurgitate procedures described in excruciating detail in the text or during class. To become quantitatively literate, you must continuously practice extracting relevant information, solving problems, and communicating your understanding to others.

Collaboration with other students is encouraged. Three productive ways to structure such collaborations are think-share-discuss, review each other's answers, and try to answer each other's written questions. If you find yourself guessing or unable to obtain correct answers, seek assistance from the text, peers, the Student Teaching Assistant, or the instructor. Your goal should be to answer at least 90% of the MyLab Math homework problems correctly without assistance. These homework assignments will typically be due the Monday after the topic was covered in class by 5:00pm—remember that you need some time to prepare for the new week's classes.

Every week or two, a summary of your homework assignment grade will be transferred from your MyLab Math grade book to your Moodle grade book. For the first week and on occasion later, there will be additional tasks to complete on Moodle.

An online quiz will verify your individual understanding of the fundamental aspects of the topic. It will typically be due by Wednesday at 5:00pm. When you take the quiz, you may only use paper, writing instruments, and a simple calculator. You will typically have 20 minutes to complete each quiz. Unlike homework assignments, you will have exactly one opportunity to take each quiz. If you have read the text and view the videos with anticipation, participated in class activities, obtained a 90% on your first pass through the homework assignment, filled in any gaps that remained, and reflected upon what you were learning throughout this process, then the quiz will be easy.

Projects require synthesis and application of the knowledge obtained from the text, videos, class, and assignments to more open-ended problems. They can often be completed by groups of up to three students. The projects will sometimes seem harder simply because they are not always aligned with the material covered that week—that is the way the real world works. Collaborate with others to figure out the answers! You will have an opportunity to resubmit or to submit late each project by the due date for the next project; if you do so, your recorded grade will be $0.3 * (\text{original submission score}) + 0.7 * (\text{resubmission or late submission score})$.

A midterm exam and a comprehensive final exam will be opportunities to synthesize what you have been learning and exhibit your ability to use quantitative techniques in well-defined contexts and without assistance or collaboration.

Activities Summary

While describing the activities in which you will be engaged, several effective learning techniques were suggested: read the text and view the videos with anticipation, write specific questions if confused, self-quiz, solve as many problems independently as possible, seek assistance if needed, share your understanding with others, and assess and seek improvements to your performance. Other suggestions can be found in the text ‘A Note from the Author to the Student,’ advice from previous students document in Moodle, and the Student Success section of MyLab Math. Whatever learning techniques you decide to try, give them some time and effort. Learning to learn effectively is an important goal of a college education.

Grading

Course grades will be based on performance on assignments (15%), quizzes (15%), projects (40%), a mid-semester exam (10%), and a final exam (20%). The score for each category is capped at 100. If helpful, the final exam grade will replace the quizzes average or mid-semester exam score. The course grade will be translated into letter grades in the following manner.

Minimum Percentage	93	90	87	83	80	77	73	70	67	60	0
Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	F

Note that participation in class or the Questions and Answers forum is not an explicit part of your grade; however, it may be considered in border line situations.

Disability Services

Goshen College is committed to providing all students equal access to programs and facilities. Students who need accommodations based on disability should contact the Director of the Academic Success Center (ASC). Students must register with ASC before faculty are required to provide reasonable accommodations. For more information or to register, please contact the Director of the ASC, Judy Weaver, Good Library 112, jweaver@goshen.edu or 574-535-7560. To ensure that learning needs are met, contact the director of the ASC the first week of classes.

Other Assistance

Any student who has difficulty accessing sufficient food to eat every day, or who lacks a safe and stable place to live, and believes this may affect their performance in the course, is urged to contact the Dean of Students Gilberto Pérez Jr. (gperez@goshen.edu) for support. Furthermore, please notify the instructor if you are comfortable in doing so. He may be able to provide additional assistance or flexibility in meeting the requirements of the course.

**Collaboration
and
Academic
Integrity**

You are encouraged to use all available resources to learn the concepts and techniques discussed in this course. In particular, conversations with other students and the instructor can be an effective learning method. Reading other books and web pages can be another effective learning method. However, copying someone else's work subverts the learning process.

For homework assignments and projects, you may look at and discuss another student's work, but any written work developed during collaboration with another student should be destroyed before writing your own solutions. It is your responsibility to make sure that you have learned the material. For projects, you should give written acknowledgement to people with whom you have had discussions and to any written materials that were helpful. Any borrowing of language (sentences, clauses, or distinct phrases) should be enclosed with quotation marks and be appropriately cited.

For quizzes and exams, you may *not* use any resources unless a specific exception is stated by the instructor.

Failure to observe the above rules will result in a zero on the homework assignment, project, quiz, or exam. Any violation of academic integrity will be reported to the Associate Dean.

Observation of the above rules will help you learn the material well and give you the satisfaction of knowing that you have earned your grade.

Due Date Policy

Assignments, projects, quizzes, and exams can only be rescheduled or made up if (1) there is a serious medical problem, a death in the immediate family, or an irreconcilable conflict with another official Goshen College activity; (2) there is written documentation signed by proper authorities; and (3) the instructor is notified prior to the due date or as soon as possible afterwards.

**Course
Materials are
for Private Use**

Course materials (videos, assignments, exams, problem sets, etc) are for use in this course only. You may not upload them to external sites, share with any person outside this course, or post for public commentary without written permission from the professor. Sharing recordings outside of the class could lead to a copyright or FERPA violation. Goshen College prohibits any student from duplicating, downloading, or distributing class recordings with anyone outside of this class, for any reason.